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Book of Abstracts

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Dr. Zulfiqar Ali
Convener Technical Committee

Foreword

First National Conference on Technical Textiles (NCTT-2016) is jointly organized by NUST, Islamabad and National Textile University, Faisalabad.

The time is now right to reflect on a number of questions. Today, textile industry of Pakistan is at the crossroads of its future: Did we choose the right instruments in the crisis? Have our recovery programs had the intended effects? How can we secure lasting and sustainable growth? How do we produce long-term value creation?

The objective of this conference is to find answers to these questions. This conference is going to become one of the biggest gathering of representatives as well as experts from academia, industry and government sector to discuss how textile industry can shift to highly value added technical textiles so that exports may be enhanced.

It is an invaluable platform for the researchers and scholars of the field to share their research work about growing diversity in technology and its range of applications with Industry as well with each other. The research papers have been selected for NCTT-2016 after shear scrutiny in respect to their importance, validity and reliability. The research papers cover most of the conspicuous researches in technical textile and its related technologies, covering the main areas of technical textiles: Nonwoven, Composites, Protective textiles, functional textiles, Theoretical modelling, Medical and Healthcare, Fibers and polymers, Nanotechnologies, Smart Textiles etc.

We are thankful to all researchers and speakers from different provinces of Pakistan for their interest in presenting their research work and concern in publishing their research contributions through NCTT platform. We believe that their contribution would entail a milestone in the textiles.

At the same time, we express our gratitude to all the members of the Event Organizing Committee from National Textile University for their support in arranging and organizing this event. We are grateful to the members of Technical and Publication Committee for their valuable and endeavor in the publication process of the NCTT proceedings.

But most of all, we truly indebted to Higher Education Commission, Pakistan for realizing the importance of the conference and financial support for this case. We hope the conference immense benefit for researchers, professionals, and other involved in the worldwide innovation in Technical Textiles.

Dr. Syed Talha Ali Hamdani
Chief Organizer

Dr. Yasir Nawab
Conference Chair

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Schedule of First National Conference on Technical Textiles 2016

Day 1 (Monday) 26th September, 2016

09:00-10:20	**Reception & Registration**	
Opening Session		
10:30-10:35	Recitation from Holy Quran	
10:35-10:50	Opening Remarks	Dr. Yasir Nawab, NTU, Fsd Dr. Mohammad Mujahid, Principle SCME, NUST
10:50-11:15	Technical Textiles: Opportunities for Pakistani's Textile Industry	Prof. Dr. Tanveer Hussain, Rector NTU
11:15-11:30	Current status of Pakistan's Textile industry and role of FGCC	Mr. Rehan Naseem Bharara, Chairman Faisalabad Garments City Company
11:30-11:45	Status of Sialkot Technical Textile Industry and expectations from academia	Dr. Khurram Khawaja Ex. President SCCI (Sialkot)
11:45-12:00	Success story of Interloop: An inspiration	Mr. Navid Fazil, COO, Interloop Limited
12:00-12:10	Importance of innovation for Pakistan's Industry	Mr. Imtiaz Rastgar, Chairman HEC Innovation Steering Committee
12:10- 12:20	Address	Ch. M. Nawaz, President FCCI
12:20-12:30	Address	Secretary Mintex
12:30- 12:45	Role of HEC/ the way forward for textile Industry	Chief Guest, Prof. Dr. Arshad Ali (Executive Director HEC)
12: 45- 14:00	**Lunch and Prayer Break**	
Technical Session 1. Session Chair Prof. Dr. Mohammad Mujahid (SCME-NUST)		
14:00-14:20	Benefits of accreditation in export of technical textiles	Ms. Ismat Gul Khattak, DG PNAC
14:20-14:40	Trends in Technical fabrics for advanced applications	Dr. Rizwan Hussain (DG- NESCOM)
14:40-15:00	Vector Protective Textiles	Dr. Mumtaz Hasan Malik, UMT, Lahore
15:00-15:20	Textile Composites: Materials of the future	Mr. Khubab Shaker, NTU, Fsd
15:20-15:40	Nanofibers: A new entry into technical textiles era	Dr. Zeeshan Khatri, MUET, Jamshoro
15:40 -16:00	**Tea Break**	
Technical Session 2. Session Chair Dr. Rizwan Hussain (NESCOM) & Mr. Farhan Latif (Director Chenab Group)		

16:00 -16:20	The industry-academia collaboration and relationship, evolution to revolution….	Dr. Habib Aslam Gaba, FCCI
16:20 -16:40	3D woven Fabrics for hi-tech applications	Mr. Ayub Asghar, NTU, Fsd
16:40 -17:00	Comparative Analysis of 2D and UD's Flexural Rigidity of Kevlar Woven Preform	Dr. Mazhar Hussain Peerzada, MUET, Jamshoro
17:00 -17:20	Role of material engineering in Textiles	Dr. Ahmad Nawaz, NUST, Islamabad
17:20 -17:40	Novel Anti-UV and Anti-fouling Polymeric Emulsions for Biomedical Textile and Fibers	Dr. Nasir Ahmad, NUST, Islamabad

Day 2 (Tuesday) 27th September, 2016

Technical Session 3. Session Chair Prof. Dr. Sheraz Siddique, NED Karachi/ Co-Chair Dr. Mazhar Hussain Peerzada		
09:00-09:20	Needleless Electro-spinning a Real-world way for the corpus fabrication of nano-fibrous membranes	Dr. Usman Ali, BZU, Multan
09:20 -09:40	Generating heat from glass fabric coated with conductive polymer	Dr. Rehan Abbasi, BUITEMS, Quetta
09:40 – 10:00	Development of steady state mathematical model for the validation of experimental Temperature-Resistance relationship of Temperature Sensing Fabric	Dr. Dawood Husain, NED Karachi
10:00 -10:20	Effect of Sphygmomanometric cuffs construction on pressure distribution	Dr. Shenela Naqvi, NED Karachi
10:20 -10:40	Application of Textile based smart sensors to improve the healthcare system	Dr. Syed Zameer Ul Hassan, BUITEMS, Quetta
10:40 -11:00	Materials for technical textiles and applications	Mr. Arshad Ali, I-Textiles
11:00 -11:20	**Tea Break**	
Technical Session 4. Session Chair Dr. Rehan Abbasi, Buitems & Mr. Talib Butt (AVP, Crescent Textile Mills Ltd)		
11:20-11:40	Dyeing of 100% Cotton Woven Fabric with reactive dye using microwave technology	Dr. Uzma Syed, MUET, Jamshoro
11:40 -12:00	Characterization of fiber glass non-woven webs by using image analysis technique	Dr. Sheraz Siddique, NED Karachi
12:00 -12:20	Textiles for Near Infrared Camouflage	Dr. Zulfiqar Ali, NTU, Fsd
12:20 -12:40	Environmental Issues of textile waste water and solution	Mr. Amjad Paracha, EHS expert
12:40 -14:00	**Lunch and Prayer Break**	
RoundTable Discussion		

14:00 -17:00	**Shifting to highly value added technical textiles: issues of textile industry and possible solutions**	*Invited participants only*
17:00	**Closing Remarks**	Professor Dr. Tanveer Hussain

Participating Organizations

Organizing Committee

Pattern in chief	**Prof. Dr. Tanveer Hussain** **(Rector), National Textile University, Faisalabad**
Chairman	Dr. Yasir Nawab (Assistant Professor) Department of Fabric Manufacturing, Convener ILIC (Industry Liaison, Innovation & Commercialization) National Textile University, Faisalabad
Chief Organizer	Dr. Syed Talha Ali Hamdani (Assistant Professor) Department of Weaving, Faculty of Engineering & Technology, National Textile University, Faisalabad
Co-Chairmen	Mr. Zafar Javed (Assistant Professor / Dean), Department of Garment Manufacturing, Faculty of Engineering & Technology, National Textile University, Faisalabad
	Dr. Ahmad Nawaz Khan (Assistant Professor) Department of Materials Engineering. SCME, National University of Sciences and Technology (NUST), Islamabad
	Dr. Mazhar Hussain Peerzada (Chairman) Department of Textile Engineering, Mehran University of Engineering & Technology Jamshoro
	Dr. Sheraz Hussain Siddique (Co-chairman) Department of Textile Engineering, NED University of Engineering and Technology, Karachi

	Dr. Syed Zameer Ul Hassan (Associate Professor) Department of Textile Engineering, Faculty of Engineering, Balochistan University of Information Technology, Engineering and Management Sciences, Quetta
Convener Technical committee	Dr. Zulfiqar Ali (Assistant Professor) Department of Yarn Manufacturing, Faculty of Engineering & Technology, National Textile University, Faisalabad

Technical Committee

Prof. Dr. Tanveer Hussain (Rector), National Textile University, Faisalabad
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Dr. Syed Talha Ali Hamdani (Assistant Professor) Department of Weaving, Faculty of Engineering & Technology, National Textile University, Faisalabad
Dr. Zulfiqar Ali (Assistant Professor) Department of Yarn Manufacturing, Faculty of Engineering & Technology, National Textile University, Faisalabad

Application of Textile Based Smart Sensors to Improve the Healthcare System

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Abstract

Smart Textiles represent the next generation of textiles anticipated for use in numerous applications. Textile based strain, bend and tactile sensors have been the center of attention since they are better alternatives to electronic sensors in association of comfort and sensibility. Our bodies continuously radiate data which contains valuable information. This data can be used to monitor health, improve sports performance, Human Machine Interface (HMI) and Human Robot Interface (HRI) technology. Research and development towards wearable textile-based personal systems allowing e.g. health monitoring, protection & safety, and healthy lifestyle increased solid enthusiasm during the last 10 years. In this work knitted strain sensors of different combinations made with conductive yarn (80% polyester, 20% steel) have been compared with respect to the change in their resistance. The aim of the research is to analyze the effects of knitting structure, Lycra yarn knitted in parallel with conductive yarn, and stitched elastic tape on sensor's sensitivity, linearity, hysteresis and stability. Linear Regression technique was used to find out the strain versus resistance relationships. Sensitivity and linearity factors were analyzed using Gauge factor and coefficient of linear regression values respectively. Hysteresis and repeatability analysis were also performed for each sensor.

Keywords: Wearable electronics, strain sensors, health care system and posture

Characterization of Fiberglass Nonwoven Webs by Using Image Analysis Technique

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Abstract

The technique of image analysis is gaining importance in the field of evaluating textile materials in the recent times. This technique is non-destructive and involves taking images of the materials using scanners and microscopes.

These images could be analyzed for determining fiber orientation using Fast Fourrier Transform technique (FFT), determining the defects on the surface of the material, determining fabric and yarn porosity and some other desired characteristics of textile materials.

In the field of nonwovens, it is more important to rely on these techniques, because we do not have fabric specifications like; ends per inch, picks per inch or a specific weave structure.

In this paper, techniques of image analysis i.e. Fast Fourrier transform (FFT) is used to determine fiber orientation and the technique of Image processing is used to determine defects of nonwoven webs. Fiberglass nonwoven webs were manufactured using chopped fiberglass strands of 6mm by using wet-laid method i.e. modifying paper hand sheet making method.

The results suggest that the process of dispersion and de-flocculation help to improve the quality of webs by decreasing the number of defects. All the nonwoven webs manufactured by this technique show a random orientation of fibers.

Keywords: Fiberglass nonwovens, webs, dispersion, de-flocculation and image analysis

Comparative Analysis of 2D and UD's Flexural Rigidity of Kevlar Woven Preform

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Abstract

Bending property has been main focus of research for many years but it's limited only to fabrics for apparel purpose. As high performance fabrics are concerned there is much less studied about bending property. Bending property influences handle and formability of fabrics. For textile research and industrial applications, a thorough understanding of fabrics bending behavior is very noticeable. Kevlar being the high leading technical material has very limiting application due to its stiffness so it's very important to analyze it's bending property with different aspect. There are many factors which affect the drape quality of fabric; thread count and method of construction. Depending of fabric structure, a wide range of stiffness of fabric is possible. The fabric having long floats in weave can be more flexible, bending very easily. In contrast, fabric having small floats do not drape well.

According to various studies, it is proved that fabric's bending has been main cause of deformation. Other factors which affect the drape property are; bending length, shear property, young's modulus and weight of fabric. The bending rigidity and weight of fabric are the most known parameters of drape The actual draping at any point in garment depends upon the total weight hanged from that point. It is closely related to weaving parameters. As for manufacturing of composite material products are concerned, the draping of woven fabrics is of greater significance. For example, processes like Resin Transfer Molding (RTM), and in the thermoforming of prepreg; the fabric must have enough drapeability to put in the mold in desired shape.

Kevlar Preform is one of the leading high-tech material and used in several applications such as bullet proof fabric, fire proof clothing, industrial clothing, cut resistance etc. It can still be used in several more technical textile applications but due to it rigidity and stiffness nature, it

is difficult to manufacture different fabric structures. Much less has been investigated on bending characteristics of high performance fibers i.e. Carbon, Kevlar, Glass fibers. Today, advanced composites are aimed for applying to complex-shaped parts for large production volume. In addition to mechanical performance, Market requirements are also focused on process ability, near-net shaping and overall cost. Therefore, it's very encouraging to analyze bending property of High-Tech material that could discover vast application and uses.

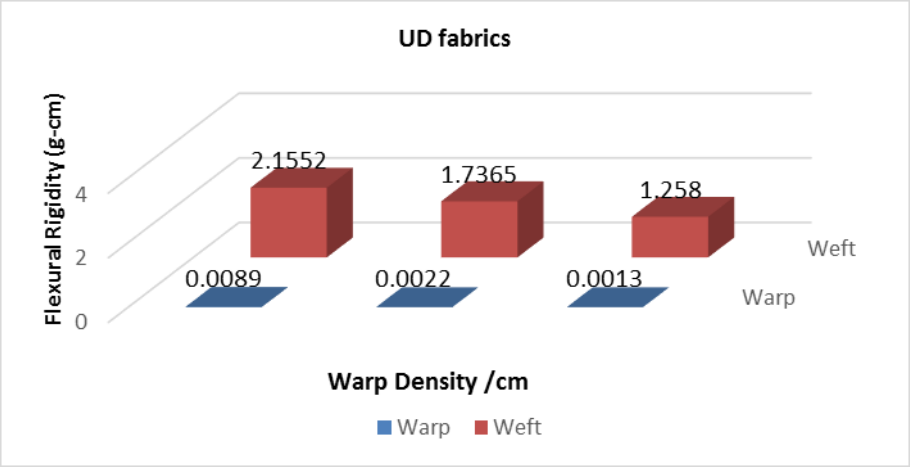

Figure 1. Flexural rigidity of UD samples with different warp density

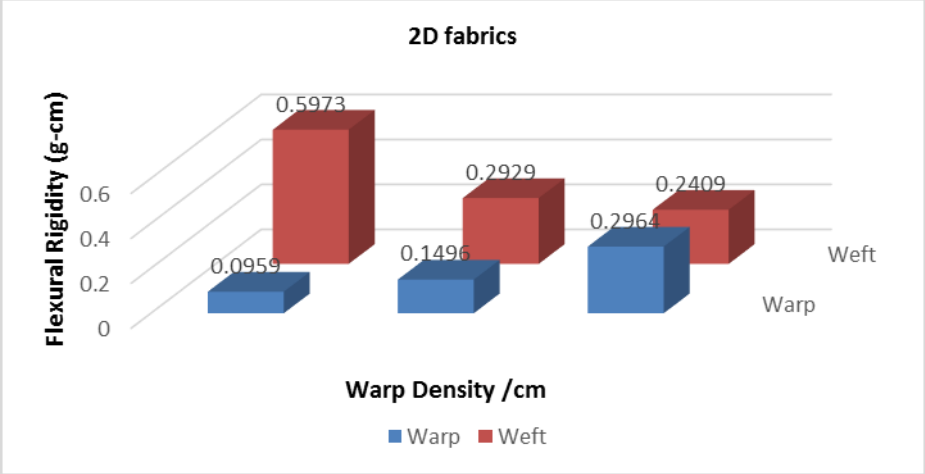

Figure 2. Flexural rigidity of 2D samples with different warp density

In this research two sets of fabric's structures were chosen for investigation. First group is UD plain fabric having further three types of fabric with warp density 3, 5 and 7 yarns/cm. Second group is 2D plain fabric having same warp density similar to UD. In UD fabric lengthwise yarn is polyester filament while other is Kevlar tow whereas 2D has Kevlar tow in both directions. Results reveals that (shown in Figure 1 and Figure 2) flexural rigidity of both UD and 2D fabrics increased in weft direction. It was also observed that only flexural rigidity in warp wise

increased in 2D fabric while it was little change in UD fabric. Furthermore, SEM images shows that angle formation by yarns in 2D fabric is much less than the UD fabric. It also shows that 2D fabric has more stiffness than the UD.

Keywords: Flexural rigidity, 2D woven fabric, UD woven fabric and Kevlar fabric

Development of Steady State Mathematical Model for the Validation of Experimental Temperature-Resistance Relationship of Temperature Sensing Fabric

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Abstract

Continuous measurement of temperature profiles on the surface of the human body offers various kinds of information valuable for clinical diagnosis and as a useful guide to take suitable action. A textile based temperature resistance detector has been developed recently, which could be used to measure the human body temperature round the clock. In order to calibrate these sensing fabric, a customized test rig has been developed. Validation of experimental results by modelling was one of the prime objectives of this study. This article explains the mathematical model of the rig components, developed under the steady state conditions, by the application of basic heat transfer principles. It was concluded that the temperature varies linearly across the TSF in test rig setting while the temperature of the sensing element can be calculated by knowing its exact position within the TSF. This information would help to calibrate the TSF samples in a better way and avoid the individual testing and repetition of experiments on a test rig.

Keywords: Temperature sensing fabric, mathematical model, steady state, heat transfer, smart textiles and human body temperature

Dyeing of 100% Cotton Woven Fabric with Reactive Dye Using Microwave Technique

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Abstract

The introduction of microwave technique in textile processing reduces energy cost, gives fast, effective and uniform heating over conventional heating system. It has been observed that microwave irradiation was used in different processes of textiles such as pad-batch dyeing of wool fiber, dyeing of flax fiber with reactive dyes and dyeing of polyester fabric with disperse dyes. However, to the best of our knowledge, not much work has been carried out on dyeing of cotton fabric with reactive dyes using microwave technique. Therefore, the present study is based on exhaust dyeing of 100% cotton woven fabric with tri-functional reactive dye (Aviera SE) by microwave irradiations. The fabric samples were dyed by microwave dyeing process with different concentration of salt (53 - 40 g l^{-1}) at varied temperature (70 - 90 °C) and time (3 - 5 min). Moreover, for comparison, the fabric samples were also dyed with the recommend recipe and method (53 g l^{-1} salt at 60°C for 60 min dyeing cycle) given by Huntsman (Germany) using conventional high temperature dyeing machine. The dyeing behavior were assessed; such as $(K/S)_{\lambda max}$ value by spectrophotometer, washing fastness by grey scale, light fastness by blue wool scale, fabric strength by Titan and TDS test by Bante instrument. The results of conventional dyeing technique and microwave technique were then compared. It has been observed that the microwave irradiation using 3 min dyeing cycle gives excellent $(K/S)_{\lambda max}$ value, uniform dye penetration along with increase fabric strength and less TDS in effluent compared to the conventional dyeing technique (60 min dyeing cycle). Hence, dyeing of cotton fabric with reactive dye (Aviera SE) using microwave technique is not only an environmental friendly process (reduces energy and time and less hazardous effluent) but also increases the production.

Keywords: Exhaust method, temperature, time, environmental friendly and Aviera SE

Effect of Sphygmomanometric Cuffs Construction on Pressure Distribution

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Abstract

After skin temperature, pulse rate and blood pressure are the second most frequently measured physiological parameters in a clinical practice. The principal component of most indirect blood pressure measurement systems is an inflatable cuff. Different types of cuffs are available worldwide and most of those are constructed from fabrics. In this study, blood pressure measurements were simulated using different types of sphygmomanometric cuffs in Abaqus and pressure distribution underneath was predicted to study their effect on blood pressure measurement. Models were validated through experimental results. In this study, pressure distribution during blood pressure measurement was predicted at the interface of the blood pressure cuffs and a metal cylinder. Interface pressure was also measured between the selected cuffs and the metal cylinder surface using a Tekscan pressure sensing system for models validation. The results of the simulation are in good agreement with experimental data. It shows that it is possible to predict the blood pressure and pressure distribution underneath different types of blood pressure measurement cuffs.

Keywords: Blood pressure measurement cuffs, Interface pressure, blood pressure measurement and finite element analysis

Environmental Issues of Textile Waste Water and its Solution

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Abstract

Largest industry of Pakistan is textile industry. Almost in all references, it is the largest industry of Pakistan e.g. number of units, number of employees, user of electricity, user of water, and largest polluter also.

Textile waste water first issue is quantity of waste water to be polluted then the issues are color BOD COD TSS and to some extant heavy metals. We must have to obey the NEQS (national environmental quality standards) of Pakistan for drainage of waste water. Now our main focus is the solution of the issues.

Water has very vital importance for everyone. It is the duty of our government and textile industry association to develop the standard for the usage of water per kg of finished textile. This must be realistic but must avoid wastage of water.

Issue of pollutants in waste water is end of pipe treatment of textile wastewater. This end of pipe treatment is too much expensive. Due to expensiveness our textile units have ETP but they most are symbolic only. There is a little chance that any industry treated his waste water completely.

True copy of nature is the best solution of any environmental problem. Now what is the true copy of nature regarding the issue of textile waste water?

Waste water in nature has anaerobic, anoxic and aerobic decomposition side by side in the same time if we develop this type of ETP we will got proper results in affordable price.

Bio selectors is the solution of this problem we can reduce the expense of waste water treatment up to 50%of its operational cost. After that every textile industry becomes able to keep its ETP operational for 24 hrs. of every day.

Where there is problem there is opportunity. We have problem of temperature its recovery is opportunity. Some industries have developed this recovery system and reduce it energy expense.

Keywords: Anoxic, fermentation, bio selectors and nitrification

Functional Textiles

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Abstract

Functional textiles are the ones which, in addition to their native properties, have some addition attributes like physical self-cleaning, chemical self-cleaning, moisture management, biological self-cleaning, flame retardancy, superhydrophilicity etc. physical self-cleaning refers to cleaning of lotus effect which is cleaning of lotus leaf by rain droplets. When droplets fall on lotus leaves, they start rolling and take away all the dust and dirt particles present on them. This effect has been developed on textiles by mimicking surface topography. Hierarchical roughness structures have been developed by growth/deposition of nanostructures of different materials on microfibers of textiles. This formation on modification with hydrophobic chemicals exhibit lotus effect. Chemical self-cleaning is degradation of colour stains. The fabric has ability to clean itself from colour stains without washing. For this, textiles are functionalized with nanophotocatalysts. Biological self-cleaning is killing and growth inhibition of bacteria. Both organic and inorganic materials are used to treat textiles to render than biologically active. Commonly used materials for antibacterial activity are silver, zinc oxide, quaternary ammonium salts, triclosan etc. Flame retardant textiles have become very important during the recent years. They are developed either by adding flame retardant materials in dope at the time of spinning or the fabrics are functionalized with flame retardant compounds. The moisture management functionality is very important for apparels to be comfortable. For this, textiles are treated with hydrophilic chemicals which enhance the wicking.

Keywords: Textiles, self-cleaning, flame retardancy and nanostructures

Generating Heat from Glass Fabric Coated with Conductive Polymer

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Abstract

Vapor deposition technique was employed to coat polypyrrole (PPy) on glass substrate using $FeCl_3$ as oxidant and p-toluene sulfonic acid ($^-$OTs) as doping agent. The Joule heating effect of PPy coated E-glass fabric was studied by supplying various DC electric fields. The coated fabric exhibited reasonable electrical stability, possessed medium electrical conductivity and was effective in heat generation. An increase in temperature of conductive fabric subjected to constant voltage was observed whereas decrease in power consumption was recorded. Thickness of PPy coating on glass fibers was analyzed by Laser confocal microscope and scanning electron microscope.

Keywords: Heating, vapor deposition, glass fabric, conductive polymers and polypyrrole

Nanofibers: A New Entry in to Technical Textiles Era

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Abstract

Among many smart and technical fibers, nanofibers have shown a great deal of interest in the field of technical textiles. In general, the talk will give audience insight into the Nanofibers as a new entrant in to technical textiles era that include biosensors, tissue engineering, drug delivery, nerve regenerations and other medical applications. A broader perspective will be discussed about Nanofiber production challenges and opportunities worldwide and in Pakistan. Our recent contribution to the nanofibers research and product development will be presented and main part of the talk will cover by providing selected experimental data of our research in nanofibers such as protective clothing, Drug delivery, biosensors, artificial vein for nerve regeneration, water filters, breathable water proof fabrics, conductive nanofibers and other biomedical applications.

Keywords: Nanofibers, electrospinning, technical fibers, filters, tissue engineering and drug release

Needleless Electrospinning a Real-World Way for the Corpus Fabrication of Nanofiberous Membranes

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Abstract

In this work we designed and evaluate needleless electrospinning process based on rotating multi-needle cylindrical spinneret for the corpus production of nanofiberous membranes. Solution of Polyvinyl alcohol (PVA) was used as a model polymer to evaluate each step of process. It is well-established that electric field plays a key role in needleless electrospinning. Three dimensional (3D) finite element analyses was used to analyze the electric field profile and electric field intensity around the proposed spinneret and simple cylinder spinneret by using simulation software CAMSOL Multiphysics 5.0. The simulation results revealed that the electric field intensity is much stronger around 60KV on the tips of needles and more uniform electric field profile is distributed along the length as compared with simple cylinder spinneret. It was found that the multi-needle cylindrical spinneret needed a relatively low voltage (30KV) to initiate fiber formation and fibers were mainly formed on the top needle edge. The influence of operating parameters on fiber morphology, fiber diameter and production of nanofibers was also studied. The results show that minimum mean fiber diameter were achieved at low value of solution concentration (8%), high value of applied voltage (60KV) and maximum distance of collector from spinneret (15cm). The maximum production of nanofibers was achieved at 60KV of applied voltage, 8% of the solution concentration and higher spinneret speed (15rpm). It was concluded that proposed spinneret has the potential to spin nanofiberous membranes at industrial scale for various applications.

Keywords: Needleless electrospinning, multi-needle cylindrical spinneret, polyvinyl alcohol (PVA) and nanofiberous membranes

Novel Anti-UV and Anti-Fouling Polymeric Emulsions for Biomedical Textile and Fibres

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Abstract

A new method is investigated for UV and microbial protection of fabrics and fibres that focused on employing electrostatic self-assembly (ESA) techniques and development of polymeric emulsion. The principal focus of this work was to develop emulsion and its optimization to study its stability by varying parameters such as stirring time, stirring speed and surfactant concentration. A modified emulsion evaporation method was devised to encapsulate active ingredient for anti- UV and antifouling purposes. The emulsions were characterized by spectroscopic, microscopic, sizes and size distribution as well as extent and types of charges. Polymeric emulsion of well-controlled sizes, charges and encapsulated active agents were prepared. Developed emulsions were employed via step wise layer-by-layer approach to deposit robust functional coatings on cotton and polyester. For optimization of emulsion different factors such as stirring time, stirring speed and surfactant concentration were investigated to affect the final particle size. All the characterization results showed that the process is praiseworthy for encapsulation of active agents.

Keywords: Anti-UV, anti-fouling, emulsion and encapsulation

Role of accreditation in enhancing exports

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Abstract

International trade is the exchange of capital, goods, and services across international borders or territories. Globalization means that we all enjoy and rely on a vast number and range of products and services supplied from overseas. Every year there is an increase in global trade figures which now run into many trillions of dollars. International trade represents a large share of the gross domestic product of most countries. Supporting the continued movement of capital, goods and services between countries is therefore of huge importance not only to the health and wellbeing of individuals but also to the economic health of entire nations around the globe. As international trade has grown, so too has the number of national and international voluntary and mandatory technical regulations, standards, testing, inspection and certification procedures across all market sectors which apply to samples, products, services, management systems or personnel. Generally, these are introduced to meet the legitimate requirements of quality and safety that consumers, businesses, regulators and other organizations demand of goods and services, whatever their country of origin. It is vital, not only for individuals and organizations but for national and international economic health, that products and services can cross borders to meet global demand without causing undue risk to the health and security of individuals or the environment.

Textile is a major export of Pakistan but due to stringent requirements of other countries our exports suffer at times. In these challenging economic conditions, competing in the international market for exports of Pakistan is vital to the economy of the country, for which our exporters are to be aware of the requirements of importing countries and should be familiar on how to address and overcome the technical barriers to trade.

Operating in the public interest across all market sectors including textiles, Accreditation determines the technical competence, reliability and integrity of conformity assessment bodies. These are organizations that check conformity and compliance with standards and regulations

through testing, verification, inspection and calibration. Accreditation works through a process of transparent and impartial evaluation of these organizations against internationally recognized standards and other requirements. Accredited conformity assessment is one tool that is helping businesses not only to comply efficiently and effectively with regulations and standards around the globe but also to gain competitive advantage from doing so and to expand into new markets, including those overseas. In this way the acceptance of products and services across national borders is made easier by removing the need for them to undergo additional tests, inspections or certification in each country into which they are sold. For national authorities and regulators, confidence in the conformity assessment process underpinned by accreditation, standards can be used to support a lighter touch approach to regulation. Multilateral arrangements between national accreditation bodies have also helped make accreditation an internationally recognized 'stamp of approval' to demonstrate compliance against agreed standards and requirements. For businesses, holding accredited conformity assessment results shows credible evidence of conformance with national and international standards and regulations which can differentiate a business from its competitors. Pakistan is fortunate to have its accreditation body which is internationally recognized and has signed multilateral agreements, because of which tests, and certifications carried out in Pakistan through accredited conformity assessment bodies have worldwide acceptance.

Keywords: Pakistan national accreditation council, exports, inspection, calibration and quality control

Smart Textiles: Engine for Economic Growth

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Abstract

The textile industry of Pakistan has not only been the highest contributor in exports but the highest job creator also for last many years. Pakistan has been the 4th largest cotton producer and 3rd largest cotton consumer. Although Pakistan's textile industry is doing good in conventional textiles but its share in the technical textile is next to none. SMART textile is one of the domains of technical textiles. It has several applications in sports, military etc. Athletes need to monitor their movements, postures and exertion during practice. There are monitoring systems available which are not cumbersome. Athletes wear highly stretchable knitted vests during workout. Wearable monitoring system is one of the examples of SMART textile in sportswear. A vest is designed which is capable of measuring different parameters i.e. respiration rate, muscle activity etc. Shifting from conventional textile to technical textile may increase the textile exports of Pakistan dramatically.

Keywords: Smart textiles, sportswear and technical textiles

Textile Composites: Materials of the Future

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Abstract

Composite material is a synergistic combination of two or more chemically distinct materials, offering improved properties over the individual materials. Glass fibers are most widely used as reinforcement, but also involve some environmental concerns. There is a growing interest, therefore, in the development of natural fibre-reinforced composites, most likely due to their wide availability, low cost, environment friendliness, and sustainability. The market size for natural fibre-reinforced composites is projected to reach $5.83 billion by 2019, with a compound annual growth rate of 12.3%. The composite materials reinforced with wood, cotton, jute, flax or other natural fibres fall under this category. Meanwhile, some major factors limiting the large scale production of natural fibre composites include the tendency of natural fibre to absorb water, degradation by microorganisms and sunlight and ultimately low strength and service life. The hydrophilic nature of natural fibres is modified by certain chemical treatments like mercerisation, benzoylation, peroxide, fluorocarbon and plasma treatment, etc. These chemical treatments not only reduce the moisture regain, but also help to enhance the mechanical performance by means of better interfacial adhesion. The other problems with these composites may be addressed by the addition of some nanofillers. The ZnO nanoparticles are immobilized in the composite material to impart bio-functionality (protection against microorganisms). The resulting composites will absorb less moisture, restricting the growth of bacteria and lowering the risks of fiber degradation. Such composite materials will have enhanced service life.

Keywords: Natural fibre composites; chemical treatment and nano fillers

Textiles for Near Infrared Camouflage

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Abstract

Camouflage techniques used to cheat the opponent is considered to be the best offence without any physical war. This technique has been a long stand in the defence world and many changes have undergone to bring the best possible use of it. Textiles are widely used as the camouflage medium. As the sensor systems continue to be refined, it is necessary that the performance of camouflage materials would be continually updated.

Now a day, modern battlefield surveillance devices may operate in one or more wavebands of the electromagnetic spectrum. The NIR region of the spectrum covers the wavelength range from 0.7–2.0 μm. In this region, objects are still 'seen' by reflection. The military camouflage threat is posed by imaging devices which amplify low levels of light, including moonlight and starlight, which go under the generic name of image intensifiers. They are now smaller, lighter and more capable than earlier systems, and hence more readily usable.

In this paper, it is tried to convey details regarding what camouflage fabrics are, their manufacturing methods, the structure that determines the better camouflage, the detection systems employed, the blending of materials to the environment, the advancement in camouflage system.

Keywords: Camouflage, defense, NIR spectrum, image intensifier and textiles.

Vector Protective Textiles

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Abstract

In biology and medicine, the term “vector” stands for carriers of infectious diseases, which transmit pathogens to another organism either through contact or by biting without becoming infected itself. Protection from vectors inside the premises is successfully done by insecticide spraying, smoking, fumigation and/or air shield. However, protection of individuals in outside environment is challenging, which needs to be addressed seriously. Vector borne diseases are a major threat not only in tropical areas but also in cold-temperate zones where the presence of insects like mosquitoes can be annoying and harmful. Even today, mosquito borne diseases like malaria and dengue fever cause a lot of deaths worldwide.

Engineered fabrics are considered effective to some extent for personal protection against mosquito bites. Currently, there are three main treatment techniques of fabric with an insecticide; absorption, polymer coating and microencapsulation. The efficacy and longevity of protection provided by these techniques need to be studied carefully. The washing method and heat exposure also have an effect on the efficacy of such engineered fabrics. Thus a comprehensive study on these treatment techniques is required so that the duration of protection can be enhanced.

Keywords: Mosquito, malaria, dengue fever, insecticide, textile and pathogen